

## 4. SUMMARY OF SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

### 4.1 GENERAL

On 1 October 1980, JTWC's area of responsibility (AOR) was expanded to include the Southern Hemisphere from 180° east longitude, westward to the coast of Africa. Details on Southern Hemisphere tropical cyclones and JTWC warnings from July 1980 through June 1982 are contained in Diercks et al. (1982) and from July 1982 through June 1984, in Wirfel and Sandgathe (1986). Information on Southern Hemisphere tropical cyclones after June 1984 can be found in the applicable Annual Tropical Cyclone Report.

The NAVPACMETOCCEN, Pearl Harbor, Hawaii issues warnings on tropical cyclones in the South Pacific, east of 180° east longitude. In accordance with CINCPACINST 3140.1V, Southern Hemisphere tropical cyclones are numbered sequentially from 1 July through 30 June. This convention is established to encompass the Southern Hemisphere tropical cyclone season, which primarily occurs from January through April. There are two Southern Hemisphere ocean basins for warning purposes - the South Indian (west of 135° east longitude) and the South Pacific (east of 135° east longitude) - which are identified by appending the suffixes "S" and "P," respectively, to the tropical cyclone number.

Intensity estimates for Southern Hemisphere tropical cyclones are derived from the interpretation of satellite imagery using the Dvorak (1984) technique and, in rare instances, from surface observations. The Dvorak technique relates specific cloud signatures to maximum sustained one-minute average surface wind speeds. The conversion from maximum sustained winds to minimum sea-level pressure is obtained from Atkinson and Holliday (1977) (Table 4-1).

### 4.2 SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

The total number of significant tropical cyclones during the 1994 season (1 July 1993 - 30 June 1994) (Table 4-2) was 30 which was two more than the overall climatological mean for the past 13 years as shown in Table 4-3. However, looking at the annual variation of Southern Hemisphere Tropical Cyclones by ocean basins (Table 4-4), it becomes apparent that this mean value of 30 occurred with near normal activity in the South Pacific Ocean and

Table 4-1 MAXIMUM SUSTAINED 1-MINUTE MEAN SURFACE WINDS AND EQUIVALENT MINIMUM SEA-LEVEL PRESSURE (ATKINSON AND HOLLIDAY, 1977) RELATIONSHIP

<u>WIND-KT (M/SEC)</u>	<u>PRESSURE (MB)</u>
30 (15) .....	1000
35 (18) .....	997
40 (21) .....	994
45 (23) .....	991
50 (26) .....	987
55 (28) .....	984
60 (31) .....	980
65 (33) .....	976
70 (36) .....	972
75 (39) .....	967
80 (41) .....	963
85 (44) .....	958
90 (46) .....	954
95 (49) .....	948
100 (51) .....	943
105 (54) .....	938
110 (57) .....	933
115 (59) .....	927
120 (62) .....	922
125 (64) .....	916
130 (67) .....	910
135 (69) .....	906
140 (72) .....	898
145 (75) .....	892
150 (77) .....	885
155 (80) .....	879
160 (82) .....	872
165 (85) .....	865
170 (87) .....	858
175 (90) .....	851
180 (93) .....	844

Australian basins and slightly higher than normal activity in the South Indian Ocean basin.

The JTWC was in warning status a total of 109 days, which included 44 days when warnings were issued on two or more Southern Hemisphere tropical cyclone. A chronology of

the tropical cyclone activity is provided in Figure 4-1. All tropical cyclone warnings with the exception of those for Tropical Cyclone were preceded by Tropical Cyclone Formation Alerts. Composites of the best tracks appear in Figures 4-2 and 4-3.

**Table 4-2 SOUTH PACIFIC AND SOUTH INDIAN OCEAN SIGNIFICANT TROPICAL CYCLONES  
(1 JULY 1993 - 30 JUNE 1994)**

TROPICAL CYCLONE	PERIOD OF WARNING	WARNINGS ISSUED	MAX SURFACE WINDS-KT (M/SEC)	ESTIMATED MSLP (MB)
01S Alexina	09 Nov - 13 Nov	13	60(31)	980
02S Bettina	26 Nov - 29 Nov	7	55(28)	984
03S Cecilia	13 Dec - 21 Dec	17	85(44)	958
04S Naomi	16 Dec - 17 Dec	3	55(28)	984
05P Rewa	28 Dec - 13 Jan	37	125(64)	915
06S Oscar	31 Dec - 04 Jan	12	40(21)	994
07P	06 Jan - 07 Jan	3	30(15)	1000
08S Daisy	10 Jan - 14 Jan	10	95(49)	949
09S Pearl	12 Jan - 19 Jan	16	90(46)	954
10S Edema	14 Jan - 18 Jan	10	50(26)	987
11P Sarah	22 Jan - 28 Jan	14	100(51)	944
12S Quenton	25 Jan - 28 Jan	7	75(39)	968
13S Geralda	27 Jan - 04 Feb	19	145(75)	892
14P Sadie	30 Jan - 31 Jan	3	35(18)	997
15S Hollandia	07 Feb - 14 Feb	17	105(54)	938
16S Ivy	10 Feb - 19 Feb	26	100(51)	944
17S	18 Feb - 20 Feb	6	35(18)	997
18P Theodore	23 Feb - 27 Feb	9	115(59)	927
19S Kelvina	07 Mar - 10 Mar	6	50(26)	987
20S Litanne	08 Mar - 17 Mar	19	130(67)	910
21S Mariola	11 Mar - 17 Mar	14	90(46)	954
22S Sharon	14 Mar - 18 Mar	19	110(57)	933
23S*Nadia	20-25 Mar/28-01 Apr	31	120(62)	922
24P Tomas	22 Mar - 25 Mar	8	105(54)	938
25P Usha	25 Mar - 28 Mar	7	55(28)	984
26S Odille	30 Mar - 14 Apr	36	105(54)	938
27S Tim	31 Mar - 01 Apr	4	40(21)	994
28S Vivienne	07 Apr - 12 Apr	10	70(36)	972
29P	24 Apr - 25 Apr	3	30(15)	1000
30S Willy	29 Apr - 30 Apr	3	40(21)	994
JTWC Total		389		
		4*		
Grand Total		393		

\* Regenerated

\*\* Warnings issued by NAVPACMETOCEN

Table 4-3

MONTHLY DISTRIBUTION OF SOUTH PACIFIC AND  
SOUTH INDIAN OCEAN TROPICAL CYCLONES

YEAR (1959-1978)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
AVERAGE*	-	-	-	0.4	1.5	3.6	6.1	5.8	4.7	2.1	0.5	-	24.7
1981	0	0	0	1	3	2	6	5	3	3	1	0	24
1982	1	0	0	1	1	3	9	4	2	3	1	0	25
1983	1	0	0	1	1	3	5	6	3	5	0	0	25
1984	1	0	0	1	2	5	5	10	4	2	0	0	25
1985	0	0	0	0	1	7	9	9	6	3	0	0	30
1986	0	0	1	0	1	1	9	9	6	4	2	0	35
1987	0	1	0	0	1	3	6	8	3	4	1	1	28
1988	0	0	0	0	2	3	5	5	3	1	2	0	21
1989	0	0	0	0	2	1	5	8	6	4	2	0	28
1990	2	0	1	1	2	2	4	4	10	2	1	0	29
1991	0	0	1	1	1	3	2	5	5	2	1	1	22
1992	0	0	1	1	2	5	4	11	3	2	1	0	30
1993	0	0	1	1	0	5	7	7	2	2	2	0	27
1994	0	0	0	0	2	4	8	4	9	3	0	0	30
TOTAL	5	1	5	8	21	47	84	95	65	40	14	2	387

(1981-1994)

AVERAGE	0.4	0.1	0.4	0.6	1.5	3.4	6.0	6.8	4.6	2.9	1.0	0.1	27.6
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\* (Gray, 1979)

Table 4-4

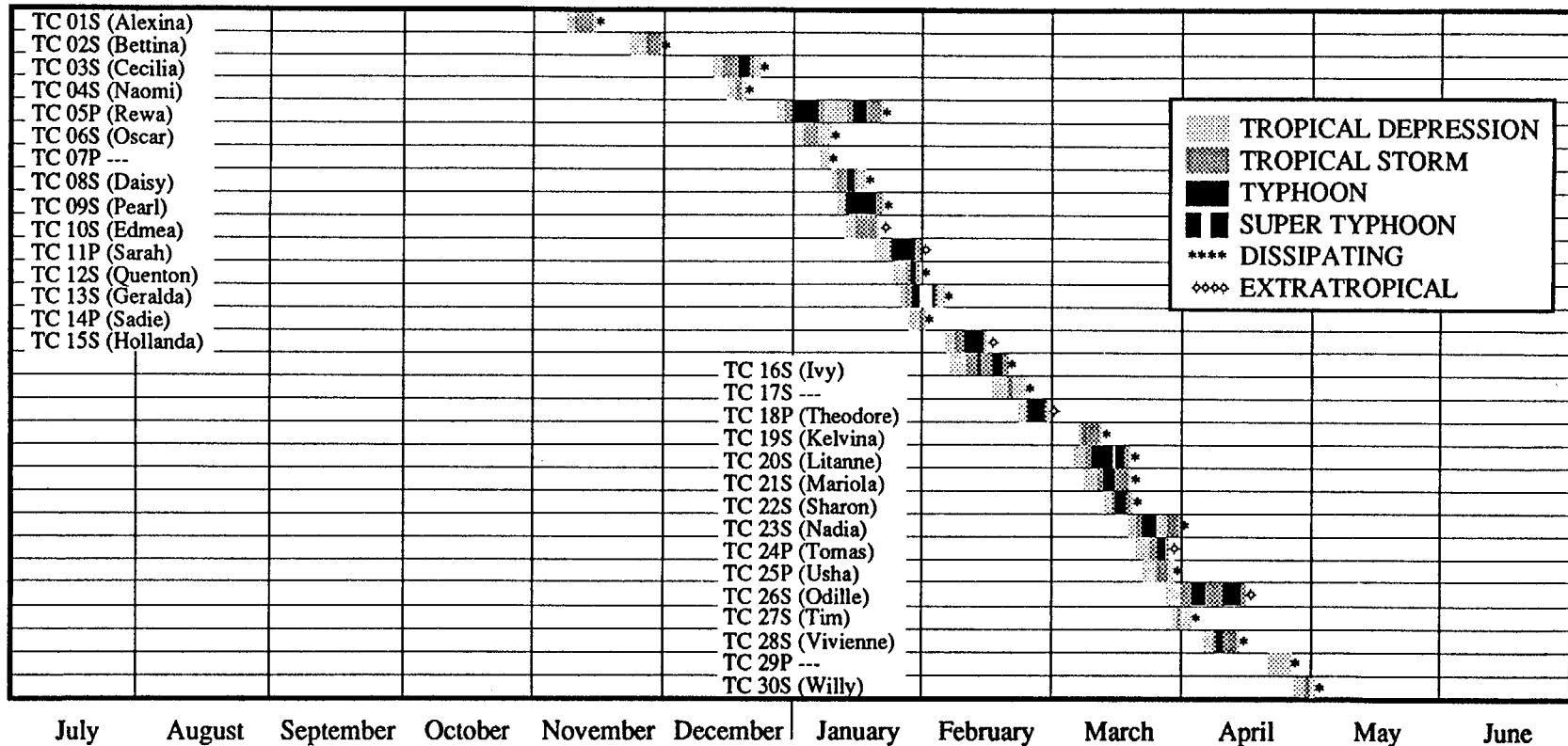
ANNUAL VARIATION OF SOUTHERN HEMISPHERE  
TROPICAL CYCLONES BY OCEAN BASIN

YEAR (1959-1978)	SOUTH INDIAN (WEST OF 105°E)	AUSTRALIAN (105°E - 165°E)	SOUTH PACIFIC (EAST OF 165°E)	TOTAL
AVERAGE*	8.4	10.3	5.9	24.7
1981	13	8	3	24
1982	12	11	2	25
1983	7	6	12	25
1984	14	14	2	30
1985	14	15	6	35
1986	14	16	3	33
1987	9	8	11	28
1988	14	2	5	21
1989	12	9	7	28
1990	18	8	3	29
1991	11	10	1	22
1992	11	6	13	30
1993	10	16	1	27
1994	16	10	4	30
TOTAL	175	139	73	387

(1981-1994)

AVERAGE	12.5	9.9	5.2	27.6
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\* (Gray, 1979)



**Figure 4-1** Chronology of South Pacific and South Indian Ocean tropical cyclones for 1994 (1 July 1993 - 30 June 1994).

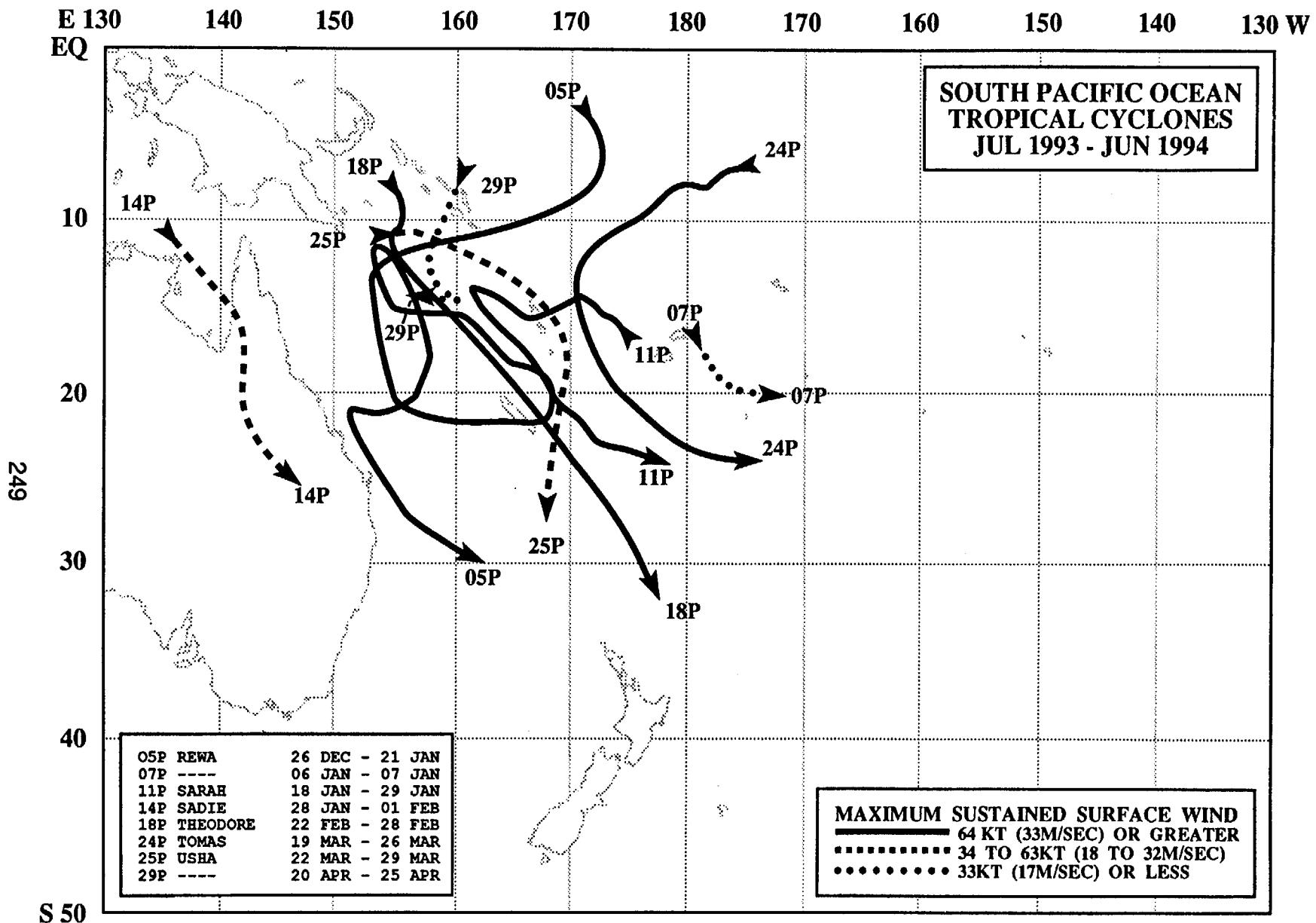


Figure 4-2 Tropical cyclone best tracks east of 130° east longitude .

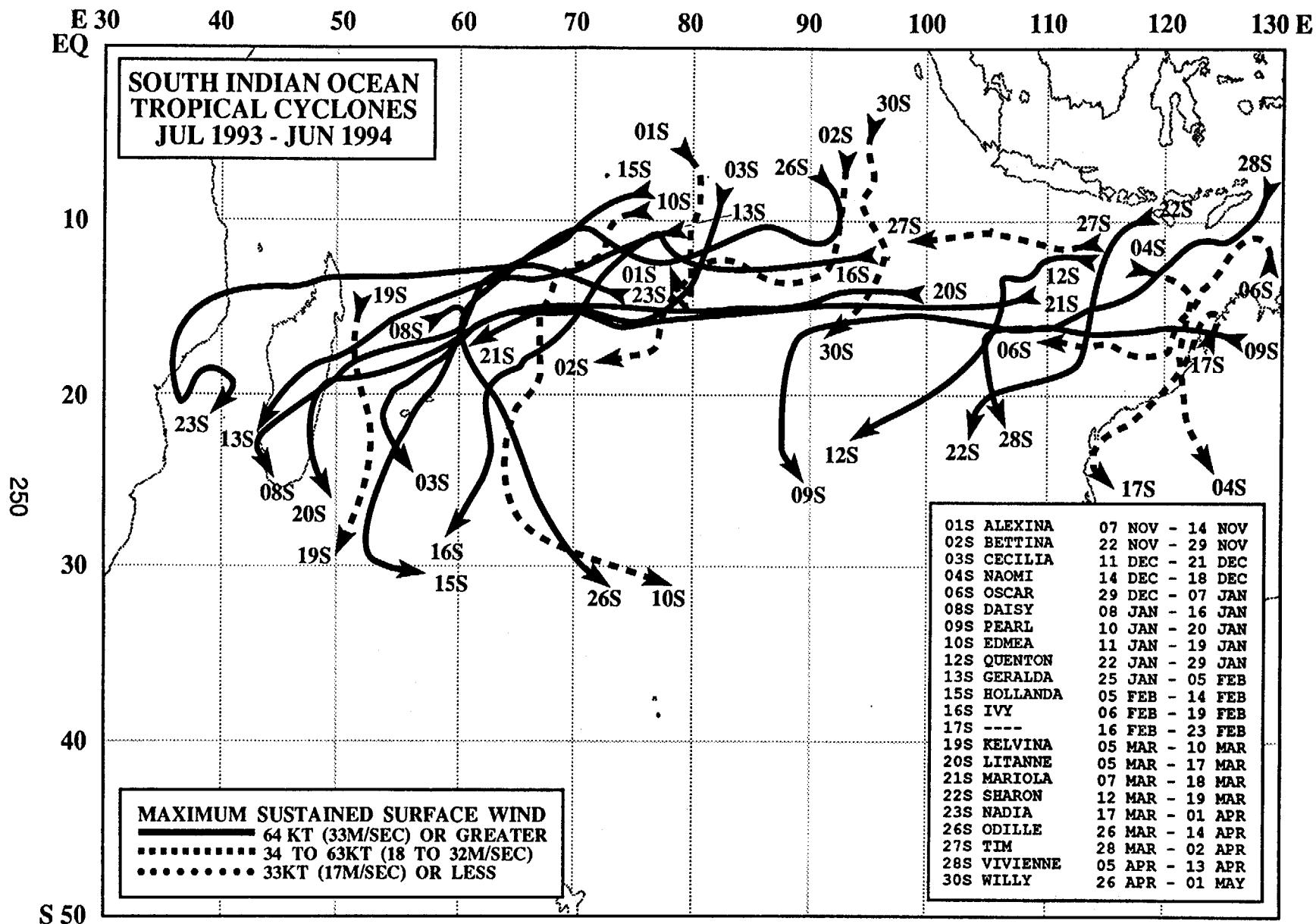


Figure 4-3 Tropical cyclone best tracks west of 130° east longitude.